CLAIMS

1. A body of fully dense metal oxide ceramic material which has been rendered electrically conductive through its thickness by the incorporation of silver into the material.

2. A body according to claim 1 wherein said thickness is no more than 1 mm.

3. A body according to claim 2 wherein said thickness is no more than 10 μm.

4. A body according to claim 1 wherein the material is alumina, chromia or alumina-rich or chromia-rich ceramic.

5. A body according to claim 1 wherein the silver extends along grain boundaries of the material.

6. A body according to claim 1 which is a layer, sheet, film or thin plate.

7. A body according to claim 6 which is a layer on a substrate.

8. A component formed of steel having a surface layer of alumina, chromia or alumina-rich or chromia-rich fully dense ceramic, said layer having been rendered electrically conductive through its thickness by the incorporation of silver into the layer.

9. A component according to claim 8 wherein the silver has been incorporated into the layer after the layer has been formed on the steel.

10. A component according to claim 8 wherein the layer has been formed by surface oxidation of the steel.

11. A component according to claim 8 which is a component for a fuel cell assembly.

12. A component according to claim 11 which is a bipolar plate.

13. A method of providing electrical conductivity through a body of fully dense metal oxide ceramic material including placing a silver-containing material into contact with the ceramic material and heating the ceramic and silver-containing materials in contact with each other to at least 750 °C such that silver migrates from the silver-containing material into the metal oxide ceramic material and creates electrically conductive pathways through the ceramic material.

14. A method according to claim 13 wherein the silver-containing material is at least commercially pure silver.

15. A method according to claim 13 wherein the silver-containing material is an alloy of silver.

16. A method according to claim 13 wherein the silver-containing material is provided on a substrate.

17. A method according to claim 13 wherein the body of metal oxide ceramic material is provided as a layer on a substrate.

18. A method according to claim 13 wherein the metal oxide ceramic material is alumina, chromia or alumina-rich or chromia-rich ceramic.

19. A method according to claim 13 wherein the silver-containing material is in the form of a sheet, a mesh or a paste.

20. A method according to claim 13 wherein said heating is to at least 800 °C, more preferably at least 850 °C, even more preferably at least 900 °C and most preferably at least 950 °C.

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21. A method of forming a steel component with a heat-resistant and electrically conductive surface layer, said method including selecting a steel which forms an alumina, chromia or alumina-rich or chromia-rich fully dense surface layer in oxidising atmosphere, placing a silver-containing material in contact with the surface of the steel, heating the steel and silver-containing material to at least 750°C in an oxidising atmosphere to cause said surface layer to form on the steel and to cause silver from said silver-containing material to occur in and create electrically conductive pathways through the layer.

22. A method according to claim 21 wherein the steel has an aluminum content of above 4.5 wt%.

23. A method according to claim 21 wherein the silver-containing material is at least commercially pure silver.

24. A method according to claim 21 wherein the silver-containing material is in the form of a sheet, a mesh or a paste.

25. A method according to claim 21 wherein said heating is to at least 800°C, more preferably at least 850°C, even more preferably at least 900°C and most preferably at least 950°C.

Dated this 27th day of March 2001
CERAMIC FUEL CELLS LIMITED.
By Its Patent Attorneys
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AMENDED SHEET
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